Pre-Calculus
Section 7.2: Ellipses and Circles Homework

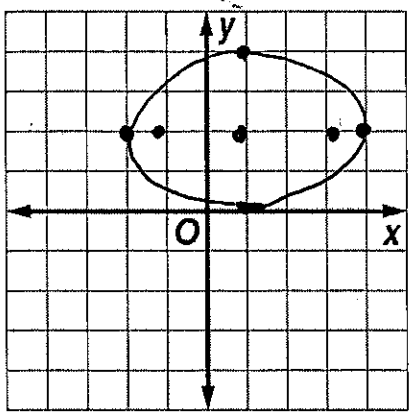
Name: Key

For numbers 1 & 2, graph the ellipse given by each equation.

1. $4x^2 + 9y^2 - 8x - 36y + 4 = 0$

$4(x^2-2x+1)+9(y^2-4y+4) = -4+4+36$

$\frac{(x-1)^2}{9} + \frac{(y-2)^2}{4} = 1$



$\frac{(x-1)^2}{9} + \frac{(y-2)^2}{4} = 1$ $c=\sqrt{5}$

Equation: _____

Foci: $(1 \pm \sqrt{5}, 2)$ $(h \pm c, k)$

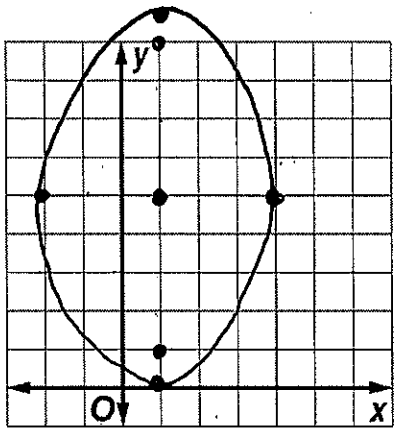
Vertices: $(4,2) + (-2,2)$

Co-Vertices: $(1,0) + (1,4)$

2. $25x^2 + 9y^2 - 50x - 90y + 25 = 0$

$25(x^2-2x+1)+9(y^2-10y+25) = -25+25+225$

$\frac{25(x-1)^2}{225} + \frac{9(y-5)^2}{225} = \frac{225}{225}$



$\frac{(x-1)^2}{9} + \frac{(y-5)^2}{25} = 1$ $c=4$

Equation: _____

Foci: $(1, 5 \pm 4)$ $(h, k \pm c)$

Vertices: $(1,0) + (1,10)$

Co-Vertices: $(-2,5) + (4,5)$

For numbers 3 & 4, write an equation for the ellipse with each set of characteristics.

3. vertices (–12, 6), (4, 6); foci (–10, 6), (2, 6)

major: 16 $c=6$

$a=8$

center: $(-4,6)$

$c^2 = a^2 - b^2$

$36 = 64 - b^2$

$b^2 = 28$

$\frac{(x+4)^2}{64} + \frac{(y-6)^2}{28} = 1$

4. foci (–2, 1), (–2, 7); length of major axis 10 units

$c=3$ so $a=5$

center: $(-2,4)$

$9 = 25 - b^2$

$\frac{(x+2)^2}{16} + \frac{(y-4)^2}{25} = 1$

For numbers 5 – 8, write each equation in standard form. Identify the related conic.

5. $y^2 - 4y = 4x + 16$ Parabola!

$y^2 - 4y + 4 = 4x + 16 + 4$

$(y-2)^2 = 4x + 20$

$\boxed{(y-2)^2 = 4(x+5)}$

6. $4x^2 - 32x + 3y^2 - 18y = -55$

$4(x^2 - 8x + 16) + 3(y^2 - 6y + 9) = -55 + 64 + 27$

$\frac{4(x-4)^2}{36} + \frac{3(y-3)^2}{36} = \frac{36}{36}$

$\frac{(x-4)^2}{9} + \frac{(y-3)^2}{12} = 1$ Ellipse!

7. $x^2 + y^2 - 8x - 24y = 9$

$x^2 - 8x + 16 + y^2 - 24y + 144 = 9 + 16 + 144$

$(x-4)^2 + (y-12)^2 = 169$

circle!

8. $x^2 + y^2 + 20x - 10y + 4 = 0$

$x^2 + 20x + 100 + y^2 - 10y + 25 = -4 + 100 + 25$

$(x+10)^2 + (y-5)^2 = 121$

circle!

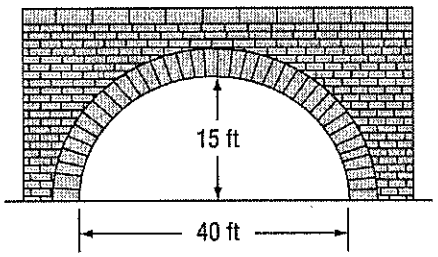
9. A semi-elliptical arch is used to design a headboard for a bed frame. The headboard will have a height of 2 feet at the center and a width of 5 feet at the base. Where should the craftsman place the foci in order to sketch the arch (In other words, find the location of the foci)?

10. A whispering gallery at a museum is in the shape of an ellipse. The room is 84 feet long and 46 feet wide.

a) Write an equation modeling the shape of the room. Assume that it is centered at the origin and that the major axis is horizontal.

b) Find the location of the foci.

11. The entrance to a tunnel is in the shape of half an ellipse as shown in the figure. (You may assume that the ellipse is centered at the origin)



a) Write an equation that models the ellipse.

b) Find the height of the tunnel 10 feet from the center.